What Is Claimed Is:

1. An image pickup system comprising:

noise estimating means for estimating the amount of noise contained in digitized signals from an image pickup element in which a plurality of pixels are arranged, for each pixel or for each specified unit area comprising a plurality of pixels;

and

noise reducing means for reducing the noise contained in the signals on the basis of the amount of noise estimated by the noise estimating means.

2. The image pickup system according to claim 1, further comprising:

color filters which are arranged at the front of the image pickup element; and

separating means for separating the signals output from the image pickup element into signals for each of the color filters.

3. The image pickup system according to claim 2, wherein the noise estimating means comprises:

parameter calculating means for calculating parameters on the basis of at least one type of information selected among the signal value level of the signals, the temperature of the image pickup element, the gain for the signals, and the shutter speed during shooting; and

noise amount calculating means for calculating the estimated amount of noise on the basis of the parameters calculated by the parameter calculating means.

4. The image pickup system according to claim 2, wherein the noise estimating means comprises upper limit value setting means for setting an upper limit value on the estimated amount of noise.

5. The image pickup system according to claim 2, wherein the noise reducing means comprises:

threshold value setting means for setting the amplitude value of the noise as a threshold value for each pixel or for each specified unit area comprising a plurality of pixels on the basis of the amount of noise estimated by the noise estimating means; and

smoothing means for reducing the amplitude component in the signals which are below the threshold value set by the threshold value setting means.

6. The image pickup system according to claim 2, wherein the noise reducing means comprises:

control value setting means for setting control values used to control the frequency characteristics of the smoothing processing on the basis of the amount of noise estimated by the noise estimating means; and

smoothing means for performing smoothing processing that reduces a specified frequency band in the signals on the basis of the control values set by the control value setting means.

7. The image pickup system according to claim 3, wherein the parameter calculating means comprises signal value calculating means for determining the signal value levels by averaging a plurality of pixel values in a nearby region of a specified size or in the unit area that includes the pixel of interest.

8. The image pickup system according to claim 3, wherein the parameter calculating means comprises a temperature sensor that measures the temperature of the image pickup element.

9. The image pickup system according to claim 3, wherein the image pickup element comprises an OB (optical black) region, and the parameter calculating means comprises:

variance calculating means for calculating the variance of the signals in the OB region; and

temperature estimating means for estimating the temperature of the image pickup element on the basis of the variance calculated by the variance calculating means.

10. The image pickup system according to claim 3, wherein the parameter calculating means comprises gain calculating means for determining the gain on the basis of at least one type of information selected among the ISO

sensitivity, exposure information and white balance information.

11. The image pickup system according to claim 3, wherein the parameter calculating means comprises shutter speed calculating means for determining the shutter speed during the shooting from exposure information.

12. The image pickup system according to claim 3, wherein the noise amount calculating means calculates the amount of noise N using the signal value level L of the signals, the temperature T of the image pickup element, the gain G for the signals and the shutter speed S during shooting as parameters, and the noise amount calculating means comprises:

coefficient calculating means for calculating four coefficients A, B, C and D on the basis of three functions a(T, G), b(T, G) and c(T, G) using the temperature T and gain G as parameters, and a function d(S) using the shutter speed S as a parameter; and

function calculating means for calculating the amount of noise N on the basis of a functional equation

$$N = (AL^B + C)D$$

defined by the four coefficients A, B, C and D calculated by the coefficient calculating means.

13. The image pickup system according to claim 12, wherein the noise amount calculating means further comprises

assigning means for assigning standard parameter values, and the parameters are values calculated by the parameter calculating means, or standard values assigned by the assigning means.

14. The image pickup system according to claim 3, wherein the noise amount calculating means comprises:

assigning means for assigning standard parameter values for parameters not obtained from the parameter calculating means; and

look-up table means for determining the amount of noise by inputting the signal value level, temperature, gain and shutter speed obtained from the parameter calculating means or the assigning means.

15. The image pickup system according to claim 1, wherein the noise estimating means comprises:

parameter calculating means for calculating parameters on the basis of at least one type of information selected among the signal value level of the signals, the temperature of the image pickup element, the gain for the signals and the shutter speed during shooting; and

noise amount calculating means for calculating the estimated amount of noise on the basis of the parameters calculated by the parameter calculating means.

16. The image pickup system according to claim 1, wherein the noise estimating means comprises upper limit value

setting means for setting an upper limit value on the estimated amount of noise.

17. The image pickup system according to claim 1, wherein the noise reducing means comprises:

threshold value setting means for setting the amplitude value of the noise as a threshold value for each pixel or for each specified unit area comprising a plurality of pixels on the basis of the amount of noise estimated by the noise estimating means; and

smoothing means for reducing the amplitude components in the signals which are below the threshold value set by the threshold value setting means.

18. The image pickup system according to claim 1, wherein the noise reducing means comprises:

control value setting means for setting control values used to control the frequency characteristics of the smoothing processing on the basis of the amount of noise estimated by the noise estimating means; and

smoothing means for performing smoothing processing that reduces a specified frequency band in the signals on the basis of the control values set by the control value setting means.

19. The image pickup system according to claim 15, wherein the parameter calculating means comprises signal value calculating means for calculating the signal value levels by

averaging a plurality of pixel values in a nearby region of a specified size or in the unit area that includes the pixel of interest.

20. The image pickup system according to claim 15, wherein the parameter calculating means comprises a temperature sensor that measures the temperature of the image pickup element.

21. The image pickup system according to claim 15, wherein the image pickup element comprises an OB (optical black) region, and the parameter calculating means comprises:

variance calculating means for calculating the variance of the signals in the OB region; and

temperature estimating means for estimating the temperature of the image pickup element on the basis of the variance calculated by the variance calculating means.

22. The image pickup system according to claim 15, wherein the parameter calculating means comprises gain calculating means for determining the gain on the basis of at least one type of information selected among the ISO sensitivity, exposure information and white balance information.

23. The image pickup system according to claim 15, wherein the parameter calculating means comprises shutter speed calculating means for determining the shutter speed during the shooting from exposure information.

24. Then image pickup system according to claim 15, wherein the noise amount calculating means calculates the amount of noise N using the signal value level L of the signals, the temperature T of the image pickup element, the gain G for the signals and the shutter speed S during shooting as parameters, and the noise amount calculating means comprises:

coefficient calculating means for calculating four coefficients A, B, C and D on the basis of three functions a(T, G), b(T, G) and c(T, G) using the temperature T and gain G as parameters, and a function d(S) using the shutter speed S as a parameter; and

function calculating means for calculating the amount of noise N on the basis of a functional equation

$$N = (AL^B + C)D$$

defined by the four coefficients A, B, C and D calculated by the coefficient calculating means.

25. The image pickup system according to claim 24, wherein the noise amount calculating means further comprises assigning means for assigning standard parameter values, and the parameters are values calculated by the parameter calculating means, or standard values assigned by the assigning means.

26. The image pickup system according to claim 15, wherein the noise amount calculating means comprises:

assigning means for assigning standard parameter values for parameters not obtained from the parameter calculating means; and

look-up table means for determining the amount of noise by inputting the signal value level, temperature, gain and shutter speed obtained from the parameter calculating means or the assigning means.

27. An image pickup system comprising:

separating means for separating digitized signals from an image pickup element which has primary- or complementary-color filters arranged at the front thereof into color signals for each of the color filters;

signal value calculating means for determining the signal value level for the respective color signals by averaging a plurality of pixel values in a nearby region of a specified size or in a unit area that includes the pixel of interest;

gain calculating means for determining the gain for the signals on the basis of at least one type of information selected among the ISO sensitivity, exposure information and white balance information;

look-up table means for determining the amount of noise by inputting the signal value level and the gain for the respective color signals and referring to a look-up table in

which a correspondence between the input values and the amount of noise is described;

small amplitude value setting means for setting a small amplitude value for each pixel or for each specified unit area comprising a plurality of pixels on the basis of the amount of noise for the respective color signals; and

smoothing means for reducing amplitude components that are equal to or less than the small amplitude value set by the small amplitude value setting means for the respective color signals.

28. An image processing program comprising:

a noise estimating routine for estimating the amount of noise contained in digitized signals from an image pickup element in which a plurality of pixels are arranged, either for each pixel or for each specified unit area comprising a plurality of pixels;

a threshold value setting routine for setting the amplitude value of the noise as a threshold value for each pixel or each specified unit area comprising a plurality of pixels on the basis of the amount of noise estimated by the noise estimating routine; and

a smoothing routine for reducing the amplitude components in the signals that are equal to or less than the threshold value set by the threshold value setting routine.

29. An image processing program comprising:

a noise estimating routine for estimating the amount of noise contained in digitized signals from an image pickup element in which a plurality of pixels are arranged, either for each pixel or for each specified unit area comprising a plurality of pixels;

a control value setting routine for setting control values used to control the frequency characteristics of the smoothing processing on the basis of the amount of noise estimated by the noise estimating routine; and

a smoothing routine for performing smoothing processing that reduces a specified frequency band in the signals on the basis of the control values set by the control value setting routine.

30. An image processing program comprising:

a variance calculating routine for calculating the signal variance in the OB regions of digitized signals from an image pickup element in which a plurality of pixels are arranged and which has an OB (optical black) region;

a temperature estimating routine for estimating the temperature of the image pickup element on the basis of the variance calculated by the variance calculating routine;

a parameter calculating routine for calculating parameters on the basis of at least one type of information selected among the temperature of the image pickup element estimated by the temperature estimating routine, the signal

value level of the signals, the gain for the signals and the shutter speed during shooting;

a noise amount calculating routine for calculating the amount of noise estimated to be contained in the signals on the basis of the parameters calculated by the parameter calculating routine, either for each pixel or a specified unit area comprising a plurality of pixels; and

a noise reducing routine for reducing the noise in the signals on the basis of the amount of noise calculated by the noise amount calculating routine.

31. An image processing program comprising:

a parameter calculating routine for calculating the signal value level L of digitized signals from an image pickup element in which a plurality of pixels are arranged, the temperature T of the image pickup element, the gain G for the signals and the shutter speed S during shooting as parameters;

a coefficient calculating routine for calculating four coefficients A, B, C and D on the basis of three functions a(T, G), b(T, G) and c(T, G) using the temperature T and gain G as parameters, and a function d(S) using the shutter speed S as a parameter;

a function calculating routine for calculating the amount of noise N estimated to be contained in the signals on the basis of a functional equation

$$N = (AL^B + C)D$$

defined by the four coefficients A, B, C and D calculated by the coefficient calculating routine, either for each pixel or for each specified unit area comprising a plurality of pixels; and

a noise reducing routine for reducing the noise in the signals on the basis of the amount of noise calculated by the function calculating routine.

32. An image processing program comprising:

a separating routine for separating digitized signals from an image pickup element which has primary- or complementary-color filters arranged at the front thereof into color signals for each of the color filters;

a signal value calculating routine for determining the signal value level for the respective color signals by averaging a plurality of pixel values in a nearby region of a specified size or in a unit area that includes the pixel of interest;

a gain calculating routine for determining the gain for the signals on the basis of at least one type of information selected among the ISO sensitivity, exposure information and white balance information;

a look-up table routine for determining the amount of noise by inputting the signal value level and the gain for the respective color signals and referring to a look-up table

in which a correspondence between the input values and the amount of noise is described;

a small amplitude value setting routine for setting a small amplitude value for each pixel or for each specified unit area comprising a plurality of pixels on the basis of the amount of noise for the respective color signals; and

a smoothing routine for reducing amplitude components that are equal to or less than the small amplitude value set by the small amplitude value setting routine for the respective color signals.